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10/717,745	11/20/2003	Christel-Loic Tisse	859063.547	8776

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EXAMINER	
LIEW, ALEX KOK SOON	
ART UNIT	**PAPER NUMBER**
2624	
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03/24/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/717,745	TISSE ET AL.	
	Examiner	Art Unit	
	ALEX LIEW	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30,32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The amendment filed on 12/18/07 is entered and made of record.

Response to Applicant's Arguments

1. On page 2 of the reply, the applicant stated:

Choi and Zhang '440 do not teach or suggest, for each pixel, choosing the pixel for the cumulating step at least according to the comparing of the luminance values of adjacent pixels to the first maximum luminance threshold. Instead, Zhang '440 teaches that the gradient of a pixel will be calculated if the gray scale value of that pixel falls within a certain range, i.e., between a median pupil value Mp and a median iris value Mi (col. 3, lines 18-22). Comparing a single gray scale value of the pixel being selected to the values Mp, Mi does not amount to a comparison of plural adjacent pixels to a maximum luminance value as recited in claim 1. At no point does Zhang '440 or Choi suggest choosing the pixels for the cumulating step at least according to a comparison of a first maximum luminance threshold to adjacent pixels in a concerned direction.

The examiner does not agree. Zhang '440 discloses the added limitations: "comparing luminance values of pixels adjacent to the pixel to the first maximum luminance threshold" (see figure 1, Mi is read as the maximum luminance threshold, the selected grayscale values must be compared against the threshold Mi in order to make the selection) and "choosing the pixel for the cumulating step at least according to the comparing of the luminance values of adjacent pixels to the first maximum luminance threshold" (see figure 1, 20, the selected pixels used to cumulate gradients in the horizontal direction are grayscale values which are between Mp and Mi, wherein Mi is the maximum threshold). In order for pixels to be selected within a range of values is to

compare each values to the minimum and maximum threshold. Also the luminance is a quantitative measure of brightness of an illuminated surface, and this luminance measurement maybe represented by the grayscale values or color values of an image.

On page 11, the applicant stated: "Step 20 does not refer to all pixels having adjacent pixels with gray scale values greater than Mp and less than Mi." The examiner would like to point column 2, lines 6 to 15, where the selection of pixels for gradient computation is located in a region between the pupil and iris, shown in the darken region of figure 2, which has 8 to 12 pixels adjacent to each other. In addition, during the comparison stage, all pixels in the darken region of figure 2, are examined and only in the choosing step, not all the pixel having adjacent pixels with gray scale values are selected; also the claim does not call for "*all* pixels having adjacent pixels."

2. On page 11 of the reply. The applicant stated: "As such, Aoyama is not selecting whether to include the central pixel in a computation based on pixels surrounding the central pixel. Instead, Aoyama is simply using all of the pixels in the 5X21 matrix with no selection of any pixel being implied, and especially no selection of pixels based on luminance values of other pixels compared to a threshold. Thus Aoyama does not supply the features missing from Choi and Zhang." The examiner does not agree. Aoyama discloses a mask which selects two pixels above the current pixel, wherein the current pixel is in the middle of the mask and selects all pixels in that particular mask, which includes the two pixels below the current pixel during filtering operation (see

figure 3). Zhang '044 discloses selecting pixels according to maximum luminance threshold.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 5 – 7, 11, 15 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi (IEEE titled: New Autofocusing Technique using Frequency Selective Weighted Median Filter for Video Cameras) in view of Zhang (US pat no 5,953,440).

With regards to claim 1, Choi discloses a method for determining a score characteristic of a definition of a digital image, comprising cumulating quadratic norms of horizontal and vertical gradient of luminance values of pixels of the image to determine a cumulated total (see equation 15, F_x^2 and F_y^2 are gradient results from horizontal and vertical directions, where the gradient calculation is shown in equation 10; the summing of the gradients in the vertical or horizontal direction is read as the cumulating step); and choosing pixels for the cumulating step (all the pixels used to cumulate the gradients). Choi does not disclose choosing the pixels for the cumulating step at least

according to a comparison of a first maximum luminance threshold to adjacent pixels in a concerned direction. Zhang discloses choosing the pixels for gradient measure step at least according to a comparison of a first maximum luminance threshold to adjacent pixels in a concerned direction (see figure 1, element 20, the pixels that are between Mp and Mi are selected to compute a gradient measure; each pixels in the left arc region or right arc region, see figure 2 area length of $0.4r_i$, are adjacent to each other and each pixel in those region are compared to both Mp and Mi thresholds to determine if the particular pixel is in range between Mp and Mi; Mi is the maximum threshold; horizontal direction is read as the concerned direction).

In addition, Zhang also discloses the added limitations: "comparing luminance values of pixels adjacent to the pixel to the first maximum luminance threshold" (see figure 1, Mi is read as the maximum luminance threshold, the selected grayscale values must be compared against the threshold Mi in order to make the selection) and "choosing the pixel for the cumulating step at least according to the comparing of the luminance values of adjacent pixels to the first maximum luminance threshold" (see figure 1, 20, the selected pixels used to cumulate gradients in the horizontal direction are grayscale values which are between Mp and Mi, wherein Mi is the maximum threshold). In order for pixels to be selected within a range of values is to compare each values to the minimum and maximum threshold.

One skilled in the art would include choosing pixel step because these pixels are use to compute the sharpness of the image to determine whether the current image need to be adjusted so that the blur in the image are minimized.

With regards to claim 2, Choi discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose dividing the cumulated total by the number of cumulated quadratic norms. It is well known in the art to obtain a percentage measure of similarity by comparing biometric images to template images from a database (see MPEP 2144.03). One skill in the art would include a dividing step because to ease setting a threshold similarity value to identify an individual ranging from 0% to 100%.

With regards to claim 5, see the rationale and rejection for claim 4. In addition, see col. 3 lines 18 – 28 of Zhang, where the selections of pixels are to avoid selecting those that are effect by specular reflection; the length of the interval can range from 1 to 2 pixels depending on the size of the specular reflection.

With regards to claim 6, in an extension to the arguments to claim 1, Zhang discloses a gradient is taken into account in the cumulated total only if its value is smaller than a predetermined gradient threshold (see fig 1 – 24 – the gradient threshold is selected to be the largest gradient value).

With regards to claim 7, in an extension to the arguments to claim 1, Zhang discloses the gradient threshold is chosen according to image contrast (the contrast of the image

depends on the gray scale value pixels, which determines the threshold, fig 1 – 14 and 16).

With regards to claim 11, in an extension to the arguments to claim 1, Zhang discloses the image is an eye image (see fig 2).

With regards to claim 15, see the rationale and rejection for claim 1.

With regards to claim 32, see the rationale and rejection for claim 1.

3. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) and Aoyama (US pat no 5,398,292).

With regards to claim 3, see the rationale and rejection for claim 1. In addition, Aoyama discloses a 5 X 21 mask to detect edge in an image (see figure 3); this edge is an alternative to the gradient measure Sobel filter shown in figure 11. This mask selects two pixels above the current pixel, given that the current is in the middle of the mask, and selects all the pixels in the mask, including the two pixels below the current pixel during filtering operation (convolution), this read on 'selecting a current pixel having a vertical or horizontal gradient to be taken into account in the cumulated total only if the luminance of two pixels distant from the current pixel by a predetermined interval in the concerned direction.' The concerned direction is vertical direction.

One skilled in the art would include a larger mask to calculate an edge or a gradient value because some edges are thicker than other edge, using a larger will compensate for the thickness of the edge calculation, which improves texture and edge detection of the image.

With regards to claim 4, an extension to the arguments in claim 1, Zhang discloses first maximum luminance threshold is chosen according to an expected luminosity of possible specular spots, which are desired not to be taken into account (see col. 1 lines 64 – 67).

3. Claims 8 – 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) as applied to claim 1 further in view of Schwartz (US pub no 2002/0181746).

With regards to claim 8, Choi discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but does not disclose step of selecting pixels which is smaller than a second threshold. Choi's second threshold is computed by taking the median of all the pupil pixels, Mp, but the pixels that are selected for gradient calculations are not smaller than Mp. Schwartz suggests using plurality of thresholds to separate the very dark pixels, which is most likely the pupil, intermediate light pixels, which represents the background, and the very bright pixels, which most likely represent the iris of the eye or a specular spot reflection

(see paragraph 105 to 109). One skill in the art would include a step of selecting pixels which is smaller than a second threshold because to distinguish the different regions of the eye image to determine correct pixels to use for gradient measure and to avoid specular spots reflection pixels to avoid identification errors.

With regards to claim 9, an extension to the arguments of rejection for claim 8, Zhang also discloses a second threshold selected to be greater than an expected light intensity o a characteristic element contained in the digital image (see fig 1, element 20, Mp).

With regards to claim 10, an extension to the arguments of rejection for claim 8, Zhang discloses element is an iris of an eye (see figure 2).

4. Claims 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang (‘440) as applied to claim 1 further in view of Zhang (US pat no 5,978,494).

With regards to claim 12, Choi discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose choosing steps to one or several images of a set of digital images representing a same object. Zhang ‘494 discloses choosing steps to one or several images of a set of digital images representing a same object (see figure 1, 18, 24 or 33). One skill in the art would include a step of choosing a best biometric image from a set of

biometric image of the same object because to enroll biometric information from the person into an individual identification system, which is use to validate an individual who is trying to gain access into a secure area, protecting the secure area.

With regards to claim 13, an extension to the arguments of claims 1 and 12, the combination of Choi, Zhang '440 and Zhang '494 disclose performing an approximate definition test on the images of the set based on cumulating of gradients in a single direction of the light intensities of the image pixels and performing the steps of cumulating the quadratic norms of horizontal and vertical gradients of luminance values of pixels of the image and choosing the pixels only on the images in the set which have successfully passed the approximate definition test (see Zhang '494 figure 1, 24 for choosing a set of candidate enrollment images and Choi and Zhang '440 disclosing the gradient measure of both single and two directions on image). See motivations provided in claims 1 and 12 for combining Choi, Zhang '440 and Zhang '494.

With regards to claim 14, an extension to the arguments of claims 12 and 13, Zhang '494 discloses selecting the clearest image from the set of images (see figure 1, 33).

5. Claims 16 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) and Cheng (US pub no 2004/0179752).

With regards to claim 16, see the rationale and rejection for claim 1. In addition, Choi and Zhang do not disclose comparing of the gradient to the maximum gradient threshold. Cheng (US pub no2004/0179752) discloses comparing a gradient of the pixel to a maximum gradient threshold and choosing the pixel for cumulating step at least according to the comparing of the gradient to the maximum gradient threshold (see paragraph 159, plurality of gradients are compared to a gradient threshold, if the gradients are less than this gradient threshold selected blue and green component pixels are selected). One skilled in the art would include step of comparing gradients to a maximum threshold because this threshold is use to determine the white areas of the eye, where the pixels there are all smooth with no edges, once the white areas is located then one will be able to locate the pupil and iris region.

With regards to claim 17, see the rationale and rejection for claim 2.

With regards to claim 18, see the rationale and rejection for claim 3.

With regards to claim 19, see the rationale and rejection for claim 3. In addition, see figure 1- 16, Mi is read as the maximum luminance threshold, of Zhang.

With regards to claim 20, see the rationale and rejection for claim 11.

6. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) and Cheng ('752) as applied to claim 16 further in view of Zhang ('494).

With regards to claim 21, see the rationale and rejection for claim 12.

With regards to claim 22, see the rationale and rejection for claim 13.

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) and Cheng ('752) as applied to claim 16 further in view of Suzaki (US pat no 6,307,954).

With regards to claim 23, Choi discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose eliminating from the eye image all pixels that are not within a predetermined vertical distance from the location of the pupil. Suzaki discloses the image is a sub-set of an eye image that is obtained by determining a location of a pupil of a pupil of the eye image and eliminating from the eye image all pixels that are not within a predetermined vertical distance from the location of the pupil (see figure 10, element 302, all the pixels above and below the rectangular window are not considered). One skill in the art would include eliminating pixels that are further away from the pupil section of the image

because to reduce the amount of searching computation where searching a smaller image takes less processing time and power.

With regards to claim 24, an extension to the arguments of claim 23, Suzaki discloses eliminating some pixels from the eye image to create a reduced image (see figure 10, pixels outside of the window 302 are not consider), determining an average luminance of each of a plurality of blocks of the reduced image (see figure 4a and 4b), determining which of the blocks has the lowest average luminance and determining a location of the block with the lowest average luminance as the location of the pupil (see column 6 lines 36 – 38, when S(X,Y) is smallest, where S(X,Y) is the value of each block in figure 4b, P(X,Y) will have the largest value, which indicates the location of the pupil). One skill in the art would look for blocks which has the lowest luminance because when using the gray scale on an image the darkest value starts from a value of zero and the brightest is two hundred fifty five, if the image is using 8 bits, since the pupil section of the eye image is one of the darkest area in the image, the system will process the eye images at a faster rate knowing the location of dark areas in the image.

8. Claims 25 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang (‘440) and Suzaki (US pat no 6,307,954).

With regards to claim 25, see the rationale and rejection for claim 1. In addition, Suzaki discloses eliminating some pixels from the eye image to create a reduced image (see

fig 10 – pixels outside of the window 302 are not consider), determining an average luminance of each of a plurality of blocks of the reduced image (see figure 4a and 4b), determining which of the blocks has the lowest average luminance and determining a location of the block with the lowest average luminance as the location of the pupil (see col. 6 lines 36 – 38, when S(X,Y) is smallest, where S(X,Y) is the value of each block in figure 4b, P(X,Y) will have the largest value, which indicates the location of the pupil). One skill in the art would look for blocks which has the lowest luminance because when using the gray scale on an image the darkest value starts from a value of zero and the brightest is two hundred fifty five, if the image is using 8 bits, since the pupil section of the eye image is one of the darkest area in the image, the system will process the eye images at a faster rate knowing the location of dark areas in the image. Suzaki also discloses the image is a sub-set of an eye image that is obtained by determining a location of a pupil of a pupil of the eye image and eliminating from the eye image all pixels that are not within a predetermined vertical distance from the location of the pupil (see figure 10, element 302, all the pixels above and below the rectangular window are not considered). One skill in the art would include eliminating pixels that are further away from the pupil section of the image because to reduce the amount of searching computation where searching a smaller image takes less processing time and power.

With regards to claim 26, see the rationale and rejection for claim 2.

With regards to claim 27, see the rationale and rejection for claim 3.

With regards to claim 28, see the rationale and rejection for claim 19.

9. Claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choi in view of Zhang ('440) and Suzaki ('954) as applied to claim 25 further in view of Zhang ('494).

With regards to claim 29, see the rationale and rejection for claim 12.

With regards to claim 30, see the rationale and rejection for claim 13.

Conclusion

This action is made final. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shorten statutory period for reply to this final action is set to expire three months from the mailing date of this action. In the event a first reply is filed within two months of the mailing date of this final action and the advisory action is not mailed until after the end of the three-month shorten statutory period, then the shorten statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however will the statutory period for reply expire later than six months from the mailing date of the final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX LIEW whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

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3/15/08